Centre	**University College of Engineering of Vitoria-Gasteiz**
Name of subject	**25998 – Robotics**
Qualification	**Degree in Industrial Electronic Engineering and Automatics**
Type	**Compulsory**
Credits	**6 ECTS**
Year	**3**
Term(s)	**2nd**
Department	**Systems and Automation Engineering**
Language	**Spanish**

Outcomes / Objectives

Principles and applications of robotised systems

Syllabus

Introduction. Origin and development of robotics. Definition of industrial robot. Classifications of robots. Applications. Robot morphology. Introduction. Mechanical structure of a robot. Transmissions and reducers. Actuators (pneumatic, hydraulic, electric). Basic sensors (position, speed, presence). Terminal elements. Spatial location. Introduction. Representation of position. Cartesian reference system. Cartesian coordinates, polar and cylindrical coordinates and spherical coordinates. Representation of orientation (rotation matrices, Euler angles, rotational torque). Homogeneous transformation matrices. Relationship and comparison between the different spatial location methods. Geometric, kinematic and dynamic modelling. Introduction. Robot direct and inverse kinematics. Differential model: direct and inverse Jacobian. Dynamic model of the mechanical structure of a rigid robot. Lagrange-Euler formulation. Newton-Euler formulation. Control systems for industrial robots. Introduction. General scheme of the control system. Software and hardware architecture of the control system. Movement types and specifications. Generation of articular movements, interpolation methods. Cartesian trajectory generation. Orientation interpolation. Singularities and trajectories. Industrial robot programming. Introduction. Programming languages. Classification. Basic characteristics of various languages. Robot programming system requirements. Examples of programming of an industrial robot. Selection and implementation of an industrial robot. Introduction. Industrial applications of robots. Criteria for the selection of an industrial robot. Implementation of a robotised system.

Methodology

Teaching Method

Face-to-Face Teaching Hours								
Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
36		6	18					
Student Hours of Non Face-To-Face Activities								
Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
63		9	18					

Assessment System

General criteria

Clarification regarding assessment

Bibliography

Basic Bibliography

- Fundamentos de Robótica, Barrientos y cols., Ed. McGraw Hill,1997
- Robótica Industrial, G. Ferraté y cols., Ed. Marcombo, 1986
- Robótica: Manipuladores y Robots Móviles. A. Ollero. Ed. Marcombo-Craig, J.J., 1989,
- Introduction to robotics, mechanics and control (2nd Ed.). Addison-Wesley, Reading, MA
- Control de Manipuladores Robóticos. Oscar Barambones.
- Teacher notes.

In-depth Bibliography

- Robótica: Control, Detección, Visión e Inteligencia. Fu González Lee. Ed. McGraw-Hill, 1988.
- Introduction To Robotics. Phillip John McKerrow. Ed. Addison-Wesley, 1993.
- Spong, M.W. and Vidyasagar, M., 1989,
- Robot dynamics and control. John Wiley, New York-Etxebarria v., 1999,
- Sistemas de control no lineal y robótica., Servicio Editorial de la UPV/EHU. Bilbao

Magazines

- Cambridge Journals Online
- Robotica-Automatica.
- International Journal of Humanoid Robotics-Robotics & Automation Magazine, IEEE-Robotics and Autonomous Systems
- Elsevier-Journal of Robotics and Mechatronics
- The International Journal of Robotics Research-International Journal of Control- IEEE Transactions on Robotics

Websites

- http://www.roboticaeducativa.com
- http://www.webdearde.com
- http://www.infoplc.net/Enlace/Enlaces_ROBOTICA.htm
- http://www.cea-ifac.es/wwwgrupos/robotica/index.html